

Amendments to the Claims

1. (currently amended) A method for storing data in one or more data storage systems by selecting from among at least a first operating mode and a delta replication operating mode, comprising:

storing data pursuant to the first operating mode;

ascertaining a first status of a criterion pertaining to an activity performed by the one or more data storage systems while operating in the first operating mode;

~~monitoring~~ detecting a change in the criterion to a second status;

in response to the change, storing data pursuant to the delta replication operating mode.

2. (original) The method of claim 1, wherein the first operating mode includes continuous replication.

3. (original) The method of claim 2, wherein the continuous replication is performed synchronously.

4. (original) The method of claim 2, wherein the continuous replication is performed asynchronously.

5. (original) The method of claim 1, wherein the one or more data storage systems include a primary storage system and a backup storage system.

6. (original) The method of claim 1, wherein the criterion includes an indicator of a performance of a communication link between a primary storage system and a backup storage system.

7. (original) The method of claim 1, wherein the second status includes an indication of an interruption in a transmission of data via the communication link.

8. (original) The method of claim 1, wherein the criterion includes a comparison of a first rate of data flowing into a memory in a data storage system, and a second rate of data flowing from the memory.

9. (original) The method of claim 8, wherein the second status includes an indication that the second rate exceeds the first rate.

10. (original) The method of claim 1, wherein the criterion includes a measure of a quantity of data stored in a memory in the data storage system.

11. (original) The method of claim 1, wherein the criterion includes a measure of a redundancy within a memory in the data storage system.

12. (currently amended) The method of claim 11, further comprising:

identifying a first quantity of data required to be transmitted from the data storage system to a backup storage system in order to store a specified set of data items by the first operating mode[[],]; and

identifying a second quantity of data required to be transmitted from the data storage system to the backup storage system in order to store the set of data items by the delta replication operating mode, wherein the measure is a comparison of the first quantity and the second quantity.

13. (currently amended) A method for storing data in one or more data storage systems by selecting from among at least a delta replication operating mode and an alternative operating mode, comprising:

storing data pursuant to the delta replication operating mode;

ascertaining a first status of a criterion pertaining to an activity performed by the one or more data storage systems while operating in the delta replication operating mode;

~~monitoring~~ detecting a change in the criterion to a second status; and

in response to the change, storing data pursuant to the alternative operating mode.

14. (original) The method of claim 13, wherein the alternative operating mode includes continuous replication.

15. (original) The method of claim 14, wherein the continuous replication is performed synchronously.

16. (original) The method of claim 14, wherein the continuous replication is performed asynchronously.

17. (original) The method of claim 13, wherein the one or more data storage systems include a primary storage system and a backup storage system.

18. (original) The method of claim 13, wherein the criterion includes an indicator of a performance of a communication link between a primary storage system and a backup storage system.

19. (original) The method of claim 13, wherein the first status includes an indication of an interruption in a transmission of data via the communication link.

20. (original) The method of claim 13, wherein the criterion includes a comparison of a first rate of data flowing into a memory in a data storage system, and a second rate of data flowing from the memory.

21. (original) The method of claim 20, wherein the first status includes an indication that the second rate exceeds the first rate.

22. (original) The method of claim 13, wherein the criterion includes a measure of a quantity of data stored in a memory in the data storage system.

23. (original) The method of claim 13, wherein the criterion includes a measure of a redundancy within a memory in the data storage system.

24. (currently amended) The method of claim 23, further comprising:
identifying a first quantity of data required to be transmitted from the data storage system to a backup storage system in order to store a specified set of data items by the delta replication operating mode[[,]]; and

identifying a second quantity of data required to be transmitted from the data storage system to the backup storage system in order to store the set of data items by the alternative operating mode, wherein the measure is a comparison of the first quantity and the second quantity.

25. (currently amended) A system for storing data by selecting from among at least a first operating mode and a delta replication operating mode, comprising:

one or more data storage systems ~~for~~ configured to:

~~storing~~ store data pursuant to the first operating mode; and

a processor ~~for~~ configured to:

~~ascertaining~~ a first status of a criterion pertaining to an activity performed by the one or more data storage systems while operating in the first operating mode[[,]];

~~monitoring~~ detecting a change in the criterion to a second status[[,]]; and[[,]]
~~in response to the change, storing~~ store data in the one or more data storage
systems pursuant to the delta replication operating mode, in response to the change.

26. (original) The system of claim 25, wherein the first operating mode includes continuous replication.

27. (original) The system of claim 26, wherein the continuous replication is performed synchronously.

28. (original) The system of claim 26, wherein the continuous replication is performed asynchronously.

29. (original) The system of claim 25, wherein the one or more data storage systems include a primary storage system and a backup storage system.

30. (original) The system of claim 25, wherein the criterion includes an indicator of a performance of a communication link between a primary storage system and a backup storage system.

31. (original) The system of claim 25, wherein the second status includes an indication of an interruption in a transmission of data via the communication link.

32. (original) The system of claim 25, wherein the criterion includes a comparison of a first rate of data flowing into a memory in a data storage system, and a second rate of data flowing from the memory.

33. (original) The system of claim 32, wherein the second status includes an indication that the second rate exceeds the first rate.

34. (original) The system of claim 25, wherein the criterion includes a measure of a quantity of data stored in a memory in the data storage system.

35. (original) The system of claim 25, wherein the criterion includes a measure of a redundancy within a memory in the data storage system.

36. (currently amended) The system of claim 35, ~~further comprising~~ wherein the processor is further configured to:

identifying a first quantity of data required to be transmitted from the data storage system to a backup storage system in order to store a specified set of data items by the first operating mode[[,]]; and

identifying a second quantity of data required to be transmitted from the data storage system to the backup storage system in order to store the set of data items by the delta replication

operating mode, wherein the measure is a comparison of the first quantity and the second quantity.

37. (currently amended) A system for storing data by selecting from among at least a delta replication operating mode and an alternative operating mode, comprising:

one or more data storage systems ~~for~~ configured to:

~~storing~~ store data pursuant to ~~the~~ a delta replication operating mode; and

a processor ~~for~~ configured to:

~~ascertaining~~ a first status of a criterion pertaining to an activity performed by the one or more data storage systems while operating in the delta replication operating mode[[,]];

~~monitoring~~ detect a change in the criterion to a second status[[,]]; and[[,]]

in response to the change, ~~storing~~ store data pursuant to ~~the~~ an alternative operating mode.

38. (original) The system of claim 37, wherein the alternative operating mode includes continuous replication.

39. (original) The system of claim 38, wherein the continuous replication is performed synchronously.

40. (original) The system of claim 38, wherein the continuous replication is performed asynchronously.

41. (original) The system of claim 37, wherein the one or more data storage systems include a primary storage system and a backup storage system.

42. (original) The system of claim 37, wherein the criterion includes an indicator of a performance of a communication link between a primary storage system and a backup storage system.

43. (original) The system of claim 37, wherein the first status includes an indication of an interruption in a transmission of data via the communication link.

44. (original) The system of claim 37, wherein the criterion includes a comparison of a first rate of data flowing into a memory in a data storage system, and a second rate of data flowing from the memory.

45. (original) The system of claim 44, wherein the first status includes an indication that the second rate exceeds the first rate.

46. (original) The system of claim 37, wherein the criterion includes a measure of a quantity of data stored in a memory in the data storage system.

47. (original) The system of claim ~~43~~ 37, wherein the criterion includes a measure of a redundancy within a memory in the data storage system.

48. (currently amended) The system of claim 47, ~~further comprising~~ wherein the processor is further configured to:

identifying a first quantity of data required to be transmitted from the data storage system to a backup storage system in order to store a specified set of data items by the delta replication operating mode[[],]; and

identifying a second quantity of data required to be transmitted from the data storage system to the backup storage system in order to store the set of data items by the alternative operating mode, wherein the measure is a comparison of the first quantity and the second quantity.

49. (new) A method to store data in a storage system comprising at least one first storage device and at least one second storage device, the method comprising:

storing first data in at least one first storage device;

storing the first data stored in the at least one first storage device in at least one second storage device;

determining a condition; and

in response to the condition:

storing second data in the at least one first storage device; and

recording one or more memory locations associated with the storing of the second data in the at least one first storage device.

50. (new) The method of claim 49, further comprising:

determining a second condition; and

in response to the second condition:

copying the second data from the at least one first storage device to the at least one second storage device, based at least in part on the one or more recorded memory locations.

51. (new) The method of claim 50, further comprising:

detecting a change of the condition to the second condition.

52. (new) The method of claim 51, comprising:

storing the first data in the at least one first storage device and in the at least one second storage device by continuous replication.

53. (new) The method of claim 51, wherein the storing of data by continuous replication comprises:

receiving a request to store specified data from a computer;

inserting the specified data in a memory;

transmitting an acknowledgment message to the computer;

transmitting the specified data to the at least one first storage device and to the at least one second storage device; and

removing the data item from the memory.

54. (new) The method of claim 51, wherein the condition comprises a status of a communication connection between the at least one first storage device and the at least one second storage device.

55. (new) The method of claim 54, wherein the condition occurs when the communication connection is interrupted.

56. (new) The method of claim 55, wherein the second condition occurs when the communication connection is in a functioning condition.

57. (new) The method of claim 51, wherein the condition is determined by determining a difference between a rate at which data are transmitted to the at least one first storage device and a rate at which data are read from the at least one first storage device and transmitted to the at least one second storage device.

58. (new) The method of claim 51, wherein the condition is determined by determining a quantity of data currently stored in a selected storage device.

59. (new) The method of claim 51, wherein the condition is determined by determining a level of redundancy within data currently stored in a selected storage device.

60. (new) The method of claim 59, wherein the level of redundancy within data currently stored in the selected storage device is determined by:

computing a ratio of (1) a first quantity of data that must be transferred from the at least one first storage device to the at least one second storage device if a first method is used to back up data currently stored in the at least one first storage device, to (2) a second quantity of data that must be transferred from the at least one first storage device to the at least one second storage device if a second method is used to back up data currently stored in the at least one first storage device.

61. (new) The method of claim 51, comprising:

recording one or more data blocks in which second data is stored in the at least one first storage device.

62. (new) A method to store data in one or more data storage systems, comprising:

storing data pursuant to a selected storage mode comprising storing the data in at least one first storage device and in at least one second storage device;

detecting a first condition pertaining to an activity associated with the storing of the data;

in response to the detected first condition:

storing data in the at least one first storage device; and

recording in a database information identifying one or more data blocks in the at least one first storage device that are changed;

detecting a second condition pertaining to the activity; and

copying the one or more data blocks from the at least one first storage device to the at least one second storage device, based on the information, in response to the detected second condition.

63. (new) The method of claim 62, further comprising:

detecting a change of the first condition to the second condition.

64. (new) The method of claim 62, wherein the selected storage mode comprises continuous replication.

65. (new) The method of claim 64, wherein the continuous replication is performed synchronously.

66. (new) The method of claim 64, wherein the continuous replication is performed asynchronously.

67. (new) The method of claim 62, wherein the first condition comprises a condition of a communication connection between the at least one first storage device and the at least one second storage device.

68. (new) A method to store data in a storage system comprising at least one first storage device and at least one second storage device and being capable of having at least a first status of a condition and a second status of the condition, the method comprising:

receiving a request to store data;

checking a status of a condition of the storage system;

if the first status is detected:

causing the data to be stored in the at least one first storage device and in the at least one second storage device; and

if the second status is detected:

storing the data in the at least one first storage device; and

recording one or more storage locations of the stored data in the at least one first storage device.

69. (new) The method of claim 68, further comprising:

checking the status of the condition; and

if it is determined that the second status has changed to a third status:

copying data from the at least one first storage device to the at least one second storage device, based at least in part on the one or more recorded storage locations.

70. (new) The method of claim 1, further comprising:

monitoring for a change in the criterion to a second status.

71. (new) The method of claim 13, further comprising:
monitoring for a change in the criterion to a second status.

72. (new) The system of claim 25, wherein the processor is further configured to:
monitor for a change in the criterion to a second status.

73. (new) The system of claim 37, wherein the processor is further configured to:
monitor for a change in the criterion to a second status.

74. (new) A system to store data, comprising:

at least one first storage device configured to store data;

at least one second storage device configured to store data;

a processor configured to:

store first data in the at least one first storage device;

cause the first data from the first storage device to be stored in at least one second
storage device;

determine a condition; and

in response to the condition:

store second data in the at least one first storage device; and

record one or more memory locations associated with the storing of the
second data in the at least one first storage device.